

1	WITH SEISMIC SHOCK GENERATING	16	.Electrically produced heat
2	BORING WITH EXPLOSION IN	17	WITH HEATING OR COOLING (1)
	INACCESSIBLE HOLE		WITHIN THE BORE, OR (2)
3	.Severing formed core by explosion	18	DRILLING FLUID
3.5	.Explosive charge carried by projectile	19	ICE BORING
4	.Driving core receiver by explosion or with receptacle collecting material in bore	20	BORING WITHOUT EARTH REMOVAL
4.5	.Directing successive projectiles or charges in same path	21	(I.E., COMPACTING EARTH FORMATION)
4.51	.With position orienting or indicating	22	.Combined with earth removal (e.g., removing sample)
4.52	.With wall engaging packer or anchor	23	.Fluid passage to exterior of drive point
4.53	.Firing chamber movable in bore relative to carrier or another firing chamber	24	.Drive point detached from shaft to form cased bore or with installation of casing
4.54	.With bore condition firing control, or compensating means	25	..Drive point retracted through shaft or casing
4.55	.Independent firing of plural charges	26	AUTOMATIC CONTROL
4.56	.Firing control mechanically actuated in bore	27	.Of fluid pressure below ground
4.57	.Projectile forms bore	28	.Of boring means including a below-ground drive prime mover
4.58	..With means to initially restrain projectile for pressure build-up	29	.Of advance or applied tool weight
4.59	..With means to prevent preliminary bore fluid contact	30	.In response to drilling fluid circulation
4.6	.Concave-shaped charge	31	WITH BIT WEAR SIGNAL GENERATING
5	BORING A SUBMERGED FORMATION	32	WITH SIGNALING, INDICATING, TESTING OR MEASURING
6	.Boring with underwater tool drive prime mover	33	.Ray energy detection or measuring
7	.Boring from floating support with submerged independent anchored guide base	34	.Indicating agent released in drilling fluid
8	.Boring from submerged buoyant support	35	.Providing identifiable indication of core position in situ for core sample orientation
9	.Boring from nonbuoyant support	36	.Tool position direction or inclination measuring or indicating within the bore
10	.Boring with submersible vertically movable guide	37	.Signaling or indicating condition of cutting in cuttings retainer
11	BORING BY DIRECTLY APPLYING HEAT TO FLUIDIZE OR COMMUNUTE	38	.Measuring or indicating drilling fluid (1) pressure, or (2) rate of flow
12	.Combustion of the formation material	39	.Transparent inspection feature
13	.With introduction of slag forming flux	40	.Indicating, testing or measuring a condition of the formation
14	.Combustion is confined chamber having restricted discharge orifice	41	WITH SELF-ACTING CYCLIC ADVANCE AND RETRACTION OF TOOL OR TOOL SHAFT
15	.Rotating the heating tool	42	

52	WITH MAGAZINE FOR SUCCESSIVELY MOVING UNCONNECTED, ORIENTED TOOL OR SHAFT SECTIONS TO USE POSITION	77	SIDE WALL TOOL FED Laterally WITHOUT ROTATION FROM INACCESSIBLE HOLE
53	ENLARGEMENT OF EXISTING PILOT THROUGHBORE REQUIRING ACCESSIBILITY TO EXISTING OPPOSITE BORE ENDS TO INSERT AND REMOVE TOOL	78	MEANS CARRIED BY HOUSING INSERTABLE IN INACCESSIBLE HOLE TO ADVANCE SIDE WALL TOOL Laterally
54	BORING BY BELOW GROUND RECIRCULATION OF UNSUPPORTED ELEMENTS (E.G., SHOT)	79	TOOL SHAFT ADVANCED RELATIVE TO GUIDE INSERTABLE IN INACCESSIBLE HOLE TO CHANGE DIRECTION OF ADVANCE
55	TOOL ACTUATION BY REACTION OF ROTATING ECCENTRIC MASS	80	.Tool telescopes over guide having surface set at angle in hole
56	NATURAL VIBRATION CHARACTERISTIC OF AN ELEMENT OF BORING MEANS RELATED (1) TO NATURAL VIBRATION CHARACTERISTIC OF ANOTHER ELEMENT, OR (2) TO FREQUENCY OF AN IMPOSED MOTION	81	.With anchor for guide engaging hole side wall
57	PROCESSES	82	.Guide carried by shaft to operative position
58	.Sampling of earth formations	83	..With clutch means acting between shaft and guide
59	..Retaining fluid or taking separate fluid sample	84	WITH ABOVE-GROUND CLEANER FOR BORING MEANS
60	..Transporting sample to surface by fluid	85	WITH ORIENTING OR RACKING MEANS FOR UNCONNECTED TOOLS OR SECTIONS OF SHAFT OR CASING
61	.Boring curved or redirected bores	86	WITH BELOW-GROUND PERSONAL ACCOMMODATION
62	.Boring horizontal bores	87	CONVERTIBLE
64	.Chemical reaction with earth formation or drilling fluid constituent	88	WITH MEANS CARRYING CUTTINGS Laterally OF BORE AXIS COMPRISING (1) CHUTE, (2) CONVEYER, OR (3) VEHICLE
65	.Boring with specific fluid	89	TOOL ELEMENT OR CONTINUOUSLY DRIVEN FLEXIBLE OR ARTICULATED ENDLESS MEMBER
66	..Treating spent or used fluid above ground	90	.Flexible or articulated member carried on support swingable or laterally movable relative to bore axis
67	..Boring by fluid erosion	91	BORING MEANS INCLUDING A CONTINUOUSLY ROTATING BIT DESCRIBING A NONCIRCULAR CROSS-SECTIONAL BORE
68	..Anti-agglomeration treatment of gaseous drilling fluid	92	WITH BELOW-GROUND TOOL DRIVE PRIME MOVER
69	..Combined liquid and gaseous fluid	93	.Below-ground (1) generation of motive fluid, or (2) storage of motivating energy
70	..Plural distinguishable liquids	94	.With below-ground feed means
71	..Gaseous fluid or under gas pressure	95	.Plural below-ground drive prime movers
72	..Prevention of lost circulation or caving	96	..Plural cutter elements driven by individual prime movers
73	MEANS TRAVELING WITH TOOL TO CONSTRAIN TOOL TO BORE ALONG CURVED PATH		
74	.Sectional guide or shaft having means to lock sections in angular relation while boring		
75	.Normally curved guide or shaft		
76	.Axially spaced opposed bore wall engaging guides		

97	.With means to anchor prime movers support to bore wall	203	WITH ABOVE-GROUND MEANS TO ADVANCE OR RETRACT BORING MEANS
98	..Expansible anchor		
99	...Fluid-operated	205	WITH MEANS PROVIDING PRESSURIZED GAS CONTACT WITH DRILLING LIQUID
100	.Discharge passage for motive fluid directed toward bore entrance	206	WITH ABOVE-GROUND MEANS FOR PREPARING OR SEPARATING DRILLING FLUID CONSTITUENTS
101	.With positive connection between tool and support shaft for rotary below ground motor	207	WITH ABOVE-GROUND MEANS FOR HANDLING DRILLING FLUID OR CUTTING
102	.With below-ground conveyer or impeller for removal of cuttings	208	.Fluid spray
103	.With above-ground means	209	.Fluid or cuttings directing or receiving means engaging bore entrance
104	.Electric		
105	..Reciprocating	210	..Anchored to bore wall
106	.With mechanical motion- converting means	211	..Axially supported by tool shaft
107	.Fluid rotary type	212	.Pressurized gas supply
108	COMMON DRIVE OR ADVANCING MEANS FOR CONCURRENTLY BORING ALONG LATERALLY SPACED AXES	213	.With suction pump inlet communicating with bore bottom
113	WITH MEANS TO SIMULTANEOUSLY FEED AND ROTATE TOOL FROM A SINGLE MECHANICAL ELEMENT	214	.Fluid head on tool shaft having lateral port and axial passage with seal for means reciprocable in the head
114	.Constant rotation rate permitted regardless of (1) release of feed force, or (2) change in feed rate	215	.With tool shaft having plural passages for drilling fluid
118	.With feed anchor in earth wall being bored	216	.Standpipe
121	.Rotary drive for relatively advancing feed screw	217	.With pump
122	WITH MEANS TO FEED DRIVE	218	.With valve
135	WITH ABOVE-GROUND MEANS TO IMPACT AN EARTH-PENETRATING MEANS	219	WITH PARTICULAR ACCOMMODATION FOR PERSONNEL (E.G., SEAT OR PROTECTOR)
161	WITH ABOVE-GROUND MEANS TO MOVE TOOL TO A DUMPING LOCATION OFFSET FROM BORE	220	WITH ABOVE-GROUND GUIDE FOR RELATIVELY ADVANCING TOOL
162	WITH ABOVE-GROUND MEANS TO FEED TOOL	226	WITH SAMPLE COVERING OR COATING MEANS (1) DISPENSED INTO SAMPLE RECEIVER, OR (2) FLUENT
170	WITH TOOL DRIVE PRIME MOVER OR ABOVE-GROUND MECHANICAL MOTION CONVERTING DRIVE MEANS	227	WITH STORAGE MEANS FOR BIT LUBRICANT CARRIED BY BIT OR SHAFT
171	.With installing casing	228	.With fluid pressure-actuated feed means
172	.With endless flexible conveyer	229	.Rotation of bit actuates lubricant feed means
173	.With diversely operated shafts extending into bore	230	WITH EXPANSIBLE BORE WALL ANCHOR (E.G., PACKER)
189	.Drive reciprocates tool	231	WITH MEANS MOVABLE RELATIVE TO TOOL BELOW GROUND TO CONTROL ECCENTRIC FLUID EMISSION
195	.Rotary drive for a relatively advancing tool (e.g., rotary table)	232	WITH MEANS MOVABLE RELATIVE TO TOOL BELOW GROUND TO STOP FLOW TOWARD BORE BOTTOM
202	ABOVE-GROUND MEANS FOR RELATIVELY MOVING BELOW-GROUND TOOL ELEMENTS	233	.Movable to seal sample receiver at bore bottom pressure

234	.With longitudinally spaced valve seats	260	..Cutter element engages torque transmitting abutment on shaft when expanded
235	..Seat engaged to stop upward flow	261	...With additional torque transmitting abutment on bit head and shaft
236	.In sample receiver removable through below-ground tool shaft	262	.Tool movable exteriorly of shaft
237	.Means comprises dropped element	263	CUTTER ELEMENT Laterally SHIFTABLE BELOW GROUND (E.G., EXPANSIBLE)
238	.Flow-stopping means includes relatively movable cutter element	264	.With separable means holding tool collapsed above ground only
239	.With undisturbed core receiver	265	.Plural cutter elements longitudinally relative movable into transverse alignment
240	..Movable means adapted to underlie severed core	266	.Plural selectively shiftable cutter elements
241	.Stops flow by movement about fixed pivot	271	.With latch operated by fluid pressure or dropped element
242	..Pivot transverse to tool axis	267	.Cutter element shifted by fluid pressure
243	.Resiliently biased or composed of flexible material	268	..With dropped element
244	WITH MEANS MOVABLE RELATIVE TO TOOL TO RECEIVE, RETAIN, OR SEVER UNDISTURBED CORE	269	..Fluid pressure acts against spring biased part
245	.Core bit closure relative upwardly movable by core	270	.Cutter element shifted by dropped element
246	.Receiver removable through below-ground tool shaft	272	.Cutter element shifted by relatively longitudinally movable threaded elements
247	..With fluid pressure-responsive means to remove receiver or operate latch	273	.Cutter element shifted by cam or gear axially rotatable relative to shaft
248	..Core forming cutting edge or element on receiver	274	.With shifting mechanism spring biased to operative position
249	.Core-retaining or severing means	275	..With separate latch
250	..Fluid-actuated	276	...Frangible or discardable element
251	..Actuated upon relative movement between tool and tool shaft	277	...Latch holds mechanism retracted
252	...Relative rotary movement	278	....Latch return shifting mechanism to inoperative position
253	..With element holding retaining or severing means inactive	279	..Cam or gear means movable to shift cutter element
254	..Mounted on transverse pivot	280	...With forwardly extending noncutting portion
255	..Sliding wedge type (e.g., slips)	281	..Cutter element substantially longitudinally movable on shaft
256	WITH RELEASABLE MEANS NORMALLY HOLDING JOINTED SHAFT SECTIONS IN ANGULAR RELATION	282	...Plural elements expanded into single socket
257	TOOL REMOVABLE OR INSERTABLE THROUGH OR AROUND DRIVING OR DRIVEN SHAFT OR CASING	283	...With forwardly extending noncutting portion
258	.Laterally shiftable cutter element movable through shaft		
259	..Plural cutter elements longitudinally relative movable into transverse alignment		

284	.Cutter element shifted by longitudinally relatively movable parts	313	WITH MECHANICAL CLEANER FOR BIT OR CUTTER ELEMENT
285	..Toggle or linkage between movable parts	314	WITH WELL-TYPE SCREEN
286	..Cam or gear engaging cutter element	315	COMBINED
287	...With separate latch holding cutter element in shifted position	316	WITH RELATIVELY MOVABLE PARTS TO FACILITATE CLEANING WITHOUT DISASSEMBLY
288	...Cutter element substantially longitudinally movable on shaft	317	WITH MEANS MOVABLE RELATIVE TO TOOL OR SHAFT TO CONTROL BELOW-GROUND PASSAGE
289	...Cutter element spring biased to retracted position	318	.Valve prevents upward flow
290	.With latch	319	BELOW-GROUND MECHANICAL MOTION CONVERTING MEANS RELATIVELY MOVING PLURAL CUTTING EDGES WITH TOOL SHAFT DETAIL
291	.Spring biased	320	
292	.Pivoted about substantially longitudinal axis	321	.Axially telescoping shaft section
293	BELOW-GROUND (1) HAMMER, OR (2) IMPACT MEMBERS	322	..Telescoping motion related to relative axial rotation or oscillation
294	.Combined with safety joint	323	.Helix or helically arranged structure
295	.With noncutting portion forwardly of sleeve impact member having a cutting portion (e.g., reamer)	324	.Means other than tool structure to induce fluent flow
296	.Fluid-operated	325.1	.Shaft carried guide or protector
297	..Restricted orifice for initially delaying escape of restraining fluid	325.2	..Coupled between shaft sections or bit and shaft section
298	.Continuous unidirectional rotary motion of one telescoping member effects consecutive impacts	325.3	...With bore wall engaging means rotatable relative to shaft section (e.g., with bearings)
299	.Resiliently biased	325.4	...Having removable inserts
300	.With releasable means to detachably retain telescoping members against axial reciprocation	325.5	..Surrounding existing shaft section
301	..Frangible	325.6	...Held by a fastener parallel to shaft axis
302	..Condition for release adjustable	325.7	...Held by discrete fastening means tangential to shaft axis
303	...Adjustable below ground	326	..Engaging means advances in adjacent hole
304	..Resiliently biased latch	327	BIT OR BIT ELEMENT
305	.Telescoping members relatively rotatable	331	.Rolling cutter bit or rolling cutter bit element
306	..With means to couple members to prevent relative rotation	332	..Core forming-type bit
307	WITH CUTTING EDGE COVER	333	...With core-breaking means
308	WITH RECEPTACLE	334	..Bit with leading cutter forming smaller diameter initial bore
309	.Removable or insertable through below-ground tool shaft	335	...Leading fixed cutter
310	.With helical conveyer	336	..Rolling cutter bit with fixed cutter
311	.Suspended below bit	337	..With drilling fluid supply to bearing
312	.Sieve or strainer	338	..With rotary or endless carrier
		339	..With drilling fluid conduit details

340	...Fluid conduit lining or element (e.g., slush tube or nozzle)	379	.Cutting edge self-renewable during operation
341	..Plural rolling cutters with intermeshing teeth	380	.Unsupported abrading particle type (e.g., shot)
342	..Adjustable cutter element	381	.Cutting edges relatively longitudinally movable during operation
343	..Wobbling cutter	382	.Adjustable cutter element
344	..Noncutting portion forwardly of rolling cutter (e.g., reamer)	383	..Adjustment presents different cutting edge
345	...Longitudinal axis cutter	384	..Radially adjustable
346	....Separable support for cutter axle	385	.Bit with leading portion (e.g., pilot) forming smaller diameter initial bore
347	....Removable axle or bushing	386	..Leading portion is separable starter
348	..Longitudinal axis cutter	387	..Leading portion is core forming type
349	..With transverse axis cutter	388	..Leading portion is a screw
350	..Laterally offset cutter axis	389	..Impact type
351	...Disk blade	390	...Plural larger diameter steps
352	....Plural coaxial cutters	391	..Plural larger diameter steps
353	...Cone or frustum rolling cutter	392	..Leading portion is forked rotary type
354	..Axle rotatable with cutter	393	.With fluid conduit lining or element (e.g., slush tube)
355	..Circumferentially displaced cutter axes	394	.With helical-conveying portion
356	...Stub axle only	395	..Impact type
357	...Detachable multiaxis support or spider	396	.Axially parallel side wall with transverse cuttings retaining portion
358	...Mutually contacting cutter supports	397	.Forked rotary nontracking
359	....With bearing or seal details	398	.Nonsymmetrical bit
360	..Cross axle with stub axle	399	..With bore wall engaging guide
361	..Cross axle	400	..Nonsymmetrical arrangement of opening for cuttings or fluid
362	..Vertically disaligned cross axle sections	401	.Cutting edges facing in opposite axial directions
363	...Separable supports	402	.Casing shoe type
364	...Removable cross axle or bushing	403	.Core forming type
365	..Outwardly directed stub axle	404	..With core-breaking means
366	..Separable support for stub axle	405	..Impact or percussion type
367	..Detachable stub axle, bushing or bearing	405.1	..Includes diamond
368	...Releasable cutter securing device	406	.Noncutting portion forwardly of cutting portion (e.g., reamer)
369	..Stub axle cutter securing means	407	..Impact type
370	...Released by antifriction bearing disassembly	408	.With bit guide or bore wall compacting device
371	..With bearing or seal details	412	.Plural separable cutter elements
372	...Antifriction type	413	..Independently attachable
373	..Disk cutter	414	.Impact or percussion type
374	..Specific or diverse material	415	..Combined with rotary
375	...Welded	416	..Noncircular bore cutter
376	..Nonsymmetrical bit (e.g., nontracking)	417	..With internal-fluid passage
377	..Spiral rib or tooth row	418	...Plural openings
378	..Irregular tooth cutter row		

- 419 ...Cruciform
- 420 ..Cruciform
- 420.1 ..Insert
- 420.2 ...Includes diamond
- 421 .Symmetrical forked rotary type
 (e.g., fishtail)
- 328 .Magnetized or with magnet
- 425 .Specific or diverse material
- 426 ..Insert
- 427 ...For a mine roof drill bit type
- 428 ...Preformed cutting element
 (e.g., compact) mounted on a
 distinct support (e.g., blank,
 stud, shank)
- 429 Including a nozzle
- 430 Having a noncircular or
 nonplanar cutting face
- 431 Having a particular
 orientation or location
- 432 With support detail
- 433 Having a specified thermal
 property
- 434 ..Diamond
- 435 ..Welded, brazed, or soldered
- 424 **MISCELLANEOUS (E.G., EARTH-BORING
 NOZZLE)**
- 423 **WEDGING SLIP ASSEMBLY FOR
 SUPPORTING A PIPE OR ROD**

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